Substitute-1 for Specification (including Claims) of PCT/US03/10327 when it enters the national phase of USA (pages which specify changes & with markings)

This is to state that this substitute specification includes no new matter.

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and at the other end it is anchored to the vehicle or to part of the auxiliary brake system in the passenger compartment. The inner cable is typically connected at one end to the standard brake pedal while the other end of the cable is connected to an auxiliary brake pedal in the passenger compartment. When the auxiliary brake pedal is operated by the instructor, as by pushing thereagainst, the inner cable is caused to slidingly move within the sheath with the end result that the inner cable pulls on the standard brake pedal to effect a brake application. This system requires a complex routing mechanism for the inner cable and the outer sheath so that a proper and effective pulling force is applied to the standard brake pedal during operation and so that normal brake operation by the student is not impeded by the auxiliary control system. Examples of prior art auxiliary brake control systems for ~~motorized~~ vehicles are found in US Patents Nos. 2,647,414 (Nafe et al); 2,677,976 (Berman); 2,710,547 (Davenport et al); 2,720,121 (Holum); 2,814,212 (Garver); 3,174,359 (Rose); and 3,435,703 (Allgaier); as well as in Swedish Patent 9500107-9 (Hakansson et al) published July 14, 1996 and in Swedish Patent No. 503,019 of March 11, 1996.

One problem associated with prior art auxiliary brake control systems is that such systems are generally intended more for permanent or semi-permanent installation in the vehicle in question. This type of installation can degrade the resale value of the vehicle if the auxiliary control system must be removed prior to resale. Additionally, such systems are not practical for the average vehicle owner who might wish to provide individual driving instruction to a friend or relative in a private vehicle. In such a situation there would be no need or desire to have a permanent installation of an auxiliary brake control system. It would be much more desirable is such a system were available which could be readily installed for use and readily removed after use without requiring the aid of a professional installer and which would not result in permanent "damage" to the vehicle when the system is no longer required. Such a system should be available commercially as a kit of parts at hardware stores or automotive supply retailers for purchase by the potential user.

SUMMARY OF THE INVENTION

The present invention overcomes the problems associated with prior art auxiliary brake control systems by providing a system which uses a minimum number of parts, which can be readily installed by an average handyman, which makes use of existing components or features of the vehicle with which it is to be used, and which does not require the provision of a permanent or fixed component in, at least, the passenger compartment of the vehicle.

The present invention makes use of a two-component cable system, such as a so-called Bowden cable, which involves a flexible yet strong outer sheath portion and a flexible yet strong inner cable portion which is slidingly located within the outer sheath portion, such that the inner cable portion projects beyond the two ends of the sheath portion. One end of the sheath portion is fixedly connected to a base member which can be positioned anywhere within the passenger compartment of the vehicle such that it is conveniently accessible to one foot of the instructor. The base member need not be affixed to the vehicle in any manner at all. The opposite end of the outer sheath portion is removably connected to a first bracket member that can be secured to the standard brake pedal on the operator's side of the vehicle.

The end of the inner cable portion that projects beyond the one end of the outer sheath is connected to one end of an auxiliary brake pedal that is pivotally connected to the base member such that if the auxiliary brake pedal is actuated, as by pressing thereon, the effect is to pull the inner cable out of the outer sheath portion which is fixed to the base member. The opposite end of the inner cable, that projects beyond the opposite end of the sheath member, is fixedly connected to a second bracket member that can be secured to the vehicle floor below the standard brake pedal, utilizing components that should already exist in the floor. It may be necessary to provide customized or semi-customized second bracket members to accommodate different makes and models of ~~motorized~~ vehicles.

At least a section between the respective ends of the outer sheath portion of the ~~The~~ two-component cable utilized in the present invention is unconstrained between the respective ends of the outer sheath portion. It is not held or otherwise supported in a secure manner to the vehicle. It is free to move at will and will normally just lie on the vehicle floor and/or a console as it extends from the base member in the passenger compartment to the brake pedal in the operator's compartment. While it would be usual for the base member to be located in the standard passenger compartment at the front of the vehicle, adjacent the vehicle operator, there is nothing other than the length of the cable to restrict the location of the base member, and hence of the instructor. Thus, given a sufficient length of cable the instructor and the base member could be located in a rear passenger compartment rather than in a front passenger compartment, as desired.

Once the auxiliary brake control system of this invention has been installed in the vehicle the instructor will be able to apply the vehicle brakes as desired or required in an emergency situation. The instructor need only step on the auxiliary brake pedal to effect a resulting application of the vehicle's brakes through operation of the standard brake pedal. When the auxiliary brake pedal is depressed the effect is to try to lengthen or reposition the inner cable portion of the two-component cable relative to the outer sheath portion. Since neither the inner cable portion nor the outer sheath portion can stretch or compress, and since the one end of the outer sheath portion is fixed in space relative to the base member, which in turn is fixed in space relative to the vehicle, the operation of the auxiliary brake pedal by the instructor will mean that there is a tendency to shorten the distance between the fixed ends of the outer sheath portion. Since that distance cannot be physically shortened due to the non-stretchable and non-compressible nature of the components the two-component cable will flex with the result that the opposite end of the outer sheath portion will push against the standard brake pedal and depress it sufficiently to operate the vehicle's brakes and to thus slow the vehicle down or even bring it to a halt. Furthermore, given the flexible nature of the two-component cable

the normal braking effect will not be hampered by the installation of the auxiliary brake control system of this invention.

In summary of the foregoing the present invention may be considered to provide an auxiliary brake control system for a wheeled vehicle having wheel brakes, and a brake pedal in an operator's compartment of the vehicle, controllable by a vehicle operator, ~~and a servo system for applying such wheel brakes when the brake pedal is depressed by the operator,~~ the brake pedal being secured to a brake arm pivotally attached to a frame member in an operator's compartment of the vehicle and being positioned above a floor section of such vehicle. The auxiliary brake control system comprises: an auxiliary brake actuator arbitrarily positionable in a passenger compartment of such vehicle, the actuator including a base member and an auxiliary pedal member pivotally attached to the base member; an elongated flexible cable member including an outer sheath portion and an inner cable portion within the sheath portion; first means connecting a distal end of the outer sheath portion to one of the base member and the auxiliary pedal member; second means connecting the opposite, proximal, end of the outer sheath portion to one of the brake arm and the floor section of said vehicle; third means connecting a distal end of the inner cable portion, extending beyond the distal end of the outer sheath portion, to the other of the base member and the auxiliary pedal member; and fourth means connecting the opposite, proximal, end of the inner cable portion, extending beyond the proximal end of the outer sheath portion, to the other of the brake arm and the floor section of said vehicle. At least a section between the distal and proximal ends of the outer sheath portion of the ~~The~~ cable member is unconstrained ~~between the distal and proximal ends of the outer sheath portion~~. When a passenger ~~steps~~ applies force on the auxiliary pedal member, the outer sheath portion of the cable member will move relative to the inner cable portion to effectively reduce the distance that the proximal end of the inner cable portion extends beyond the proximal end of the outer sheath portion, thereby causing the brake arm to move sufficiently ~~to cause the servo system~~ to apply the vehicle wheel brakes.

The present invention may also be considered to provide an auxiliary brake control system for a ~~motorized wheeled~~ vehicle having wheel brakes, and a brake pedal in an operator's compartment of the vehicle, controllable by a vehicle operator, ~~and a servo system for applying such wheel brakes when the brake pedal is depressed by the operator,~~ the brake pedal being secured to a brake arm pivotally attached to a frame member in the operator's compartment of the vehicle and being positioned above a floor section of such vehicle. The auxiliary brake control system comprises: an auxiliary brake actuator positionable in a passenger compartment of such vehicle, the actuator including a base member and an auxiliary pedal member pivotally attached to the base member; a cable member including an outer sheath portion and an inner cable portion within the outer sheath portion; first means connecting a distal end of the outer sheath portion to the base member: second means locating the opposite, proximal, end of the sheath member at the brake arm; third means connecting a distal end of the inner cable portion to the auxiliary pedal member; and fourth means connecting the opposite, proximal, end of the inner cable portion to the floor section of the vehicle. At least a section between the first and second means of the ~~The~~ cable member is unconstrained ~~between the first and second means~~. When an individual ~~steps~~ applies force on the auxiliary pedal member the outer sheath portion of the cable member will move relative to the inner cable portion such that the second connecting means will act on the brake arm to apply the vehicle wheel brakes.

The above and other features of this invention will now be described with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic view showing the general layout of the present invention as it would be used in a ~~motorized wheeled~~ vehicle;

Fig. 2 is a perspective view of the auxiliary brake actuator that is positioned in the passenger compartment of the vehicle;

Fig. 3 is perspective view of the support structure that is attached to the base of the base member;

132 washer
134 stud
136 section of outer sheath portion
138 section of outer sheath portion
140, 140' threaded end
142 adjustment member
144 central flange
146, 146' threaded tube

DETAILED DESCRIPTION--FIG.1 through FIG. 15--Preferred Embodiment

Fig. 1 illustrates in a generally schematic nature the layout of the apparatus 10 of the present invention. There, it will be seen that a wheeled vehicle (not shown) has a floor section 12 and a firewall section 14 below the vehicle dashboard (not shown). In a typical situation the vehicle will have a brake arm 16 pivotally attached at one end to a suitable mount 18 on the firewall and carrying a brake pedal pad 20 at the opposite end thereof. In normal operation, when the vehicle operator senses a need to slow or stop the vehicle the operator will step on the pad 20 to depress the brake arm 16 ~~and to cause a servo mechanism (not shown) connected thereto~~ to apply brake pressure to the brakes of the vehicle. Most vehicle brakes are power assisted so that the operator does not have to exert an inordinate amount of pressure on the pad 20 to bring the vehicle to a halt.

With the auxiliary brake control system of the present invention an auxiliary brake actuator 22 is positionable in the passenger compartment of the vehicle and a two-component cable member 24 extends from the brake actuator 22 towards the standard brake arm 16. The two-component cable member 24 includes a flexible, yet strong, outer sheath portion 26 having distal and proximal ends and an inner flexible, yet strong, cable portion 28 also having distal and proximal ends, the inner cable portion being slidingly received within the outer sheath portion and extending beyond the ends of the outer sheath portion at each end thereof. In the description of the invention as provided herein the distal ends of the cable member portions 26, 28 are the ends to be located in the passenger compartment of the vehicle while the proximal ends of the cable member portions 26, 28 are the ends to be located in the operator's compartment of the vehicle. Two-

arranging the proximal end of outer sheath portion 26 is found through adjusting the bracket 88 along the upper edge of the brake arm 16. Thirdly the adjustment member 142 is rotated in opposite direction to increase the total length of the outer sheath portion 26 enough so that the internal face of the bight portion 96 of the bracket 88 touches the upper edge of the brake arm 16. Fourthly the thumbscrews 100 are engaged with threaded holes 98 until the bottom of thumbscrews 100 engage brake arm 16 tightly. With the bracket 88 optimally positioned on the brake arm there should be no binding of the inner cable portion relative to the outer sheath portion or the bracket 88 and there should be smooth routing of the cable member to the passenger compartment of the vehicle.

Principles and Operation--FIG. 16

Fig. 16 shows the principle of operation of the present invention. It should be understood that with the components in position within a vehicle the cable member 24 is unconstrained between the brake arm 16 and the brake actuator 22 in this preferred embodiment. Thus the cable member 24 will rest on the vehicle floor and/or a console as it extends from the actuator 22 to the brake arm 16. As seen in Fig. 16 the distal end S_D of the outer sheath portion 26 is secured to the base member 30 of auxiliary brake actuator 22 and the distal end C_D of the inner cable portion 28 is attached to the lower end of the pedal 36. The length of inner cable projecting from the end of the outer sheath is shown as L_1. At the opposite end the proximal end S_P of the outer sheath portion is located at the brake arm 16 via the bracket 88 and the proximal end C_P of the inner cable portion is connected to the vehicle floor. The length of the inner cable projecting from the end of the outer sheath at the proximal end is shown as L_2. When the auxiliary pedal is operated the effect is to try to increase the length L_1 since the distal end S_D of the outer sheath portion is fixed. However, the proximal end C_P of the inner cable portion is also fixed, and consequently it is impossible for the inner cable to stretch or to lengthen relative to the outer sheath portion 26. In other words, $L_1 + L_2$ is constant. If the distance L_1 is increased due to the operation of the auxiliary pedal

then the distance L_2 must decrease. Since the distance L_2 is the length of the proximal end C_P of the inner cable portion that projects beyond the proximal end S_P of the outer sheath portion and since the proximal end C_P of the inner cable portion is fixed, the result is that the proximal end S_P of the outer sheath portion must approach the floor of the vehicle. This means that the brake arm 16 moves towards the floor, the end result being that the vehicle brakes are applied via the brake arm 16 ~~and the vehicle's servo mechanism~~.

When the brake arm 16 is depressed, whether by the auxiliary brake control system of the present invention, and/or by normal braking as initiated by the vehicle operator, the compression spring 126 located between the mounting bracket 88 and the nut 130 will be compressed somewhat. When the braking action is terminated, either by the operator removing his foot from the brake pedal 18 and/or the instructor removing his foot from the auxiliary brake pedal 36, the spring 126 will aid in returning the brake arm 16 to its normal rest position, ready for another brake application. As mentioned earlier, the tension spring 86 will help to return the auxiliary brake pedal to its normal position following operation thereof. Thus when both the auxiliary brake pedal 36 and the normal brake arm 16 are operated together both springs 86 and 126 will help to return the respective pedals to the normal rest position thereof following release thereof and they will also work together if only the auxiliary brake pedal is operated.

Since the proximal end S_P of the outer sheath portion is not fixed to the bracket 88, but only has a sliding fit within the cylindrical tube 104, the outer sheath portion will not interfere with normal operation of the brake pedal 16 and the vehicle's braking system (without operation of the auxiliary brake actuator 22), and since the tension spring 86 retains the auxiliary brake pedal 36 in its rest position, no relative movement between the outer sheath portion 26 and the inner cable portion 28 is rendered.

AUXILIARY BRAKE CONTROL SYSTEM

CLAIMS

Claim 1. (Currently amended)

An auxiliary brake control system for a ~~motorized wheeled~~ vehicle having wheel brakes, and a brake pedal in an operator's compartment of said vehicle, controllable by a vehicle operator, ~~and a servo system for applying such wheel brakes when said brake pedal is depressed by the operator,~~ said brake pedal being secured to a brake arm pivotally attached to a frame member in the operator's compartment and being positioned above a floor section of such vehicle, said auxiliary brake control system comprising: an auxiliary brake actuator positionable in a passenger compartment of such vehicle, said auxiliary brake actuator including a base member and an auxiliary pedal member pivotally attached to said base member; a cable member including an outer sheath portion and an inner cable portion within said outer sheath portion; first means connecting a distal end of said outer sheath portion to said base member: second means locating the opposite, proximal, end of said outer sheath portion at said brake arm; third means connecting a distal end of said inner cable portion to said auxiliary pedal member; and fourth means connecting the opposite, proximal, end of said inner cable portion to said floor section of said vehicle; at least a section of said cable member being unconstrained between said first and second means; whereby when a passenger ~~steps~~applies force on said auxiliary pedal member said outer sheath portion of said cable member will move relative to said inner cable portion such that said second means will act on said brake arm to apply said vehicle wheel brakes.

Claim 4. (Currently amended)

The auxiliary brake control system according to claim 3 wherein: said first end of said auxiliary pedal member includes a pad on which the passenger can ~~step~~apply force to operate said auxiliary brake control system; and said third means is adapted to connect said distal end of said inner cable portion to said second end of said auxiliary pedal member.

Claim 18. (Currently amended)

An auxiliary brake control system for a ~~motorized wheeled~~ vehicle having wheel brakes, and a brake pedal in an operator's compartment of said vehicle, controllable by a vehicle operator, ~~and a servo system for applying such wheel brakes when said brake pedal is depressed by the operator,~~ said brake pedal being secured to a brake arm pivotally attached to a frame member in an operator's compartment of the vehicle and being positioned above a floor section of such vehicle, said auxiliary brake control system comprising: an auxiliary brake actuator positionable in a passenger compartment of such vehicle, said actuator including a base member, a support structure secured to said base member and an auxiliary pedal member pivotally attached intermediate the ends thereof to said support structure above said base member; a cable member including an outer sheath portion and an inner cable portion within said outer sheath portion; first means connecting a distal end of said outer sheath portion to said support structure below said auxiliary pedal member: second means locating the opposite, proximal, end of said outer sheath portion at a mounting member adapted for removable attachment to said brake arm; third means connecting a distal end of said inner cable portion to one end of said auxiliary pedal member; and fourth means connecting the opposite, proximal, end of

said inner cable portion to a connection member adapted for removable attachment to said floor section of said vehicle below said mounting bracket; at least a section of said cable member being unconstrained between said first and second connecting means; whereby when a driving instructor ~~steps~~applies force on the other end of said auxiliary pedal member said outer sheath portion of said cable member will move relative to said inner cable portion such that said second means will act on said mounting member and thus on said brake arm to depress said brake pedal sufficiently to apply said vehicle wheel brakes.

Claim 21. (Currently amended)

An auxiliary brake control system for a ~~motorized wheeled~~ vehicle having wheel brakes, and a brake pedal in an operator's compartment of said vehicle, controllable by a vehicle operator, ~~and a servo system for applying such wheel brakes when said brake pedal is depressed by the operator,~~ said brake pedal being secured to a brake arm pivotally attached to a frame member in an operator's compartment of the vehicle and being positioned above a floor section of such vehicle, said auxiliary brake control system comprising:

an auxiliary brake actuator arbitrarily positionable in a passenger compartment of such vehicle, said actuator including a base member and an auxiliary pedal member pivotally attached to said base member;

an elongated flexible cable member including an outer sheath portion and an inner cable portion within said sheath portion;

first means connecting a distal end of said outer sheath portion to one of said base member and said auxiliary pedal member:

second means connecting the opposite, proximal, end of said outer sheath portion to one of said brake arm and said floor section of said vehicle;

third means connecting a distal end of said inner cable portion,

extending beyond said distal end of said outer sheath portion, to the other of said base member and said auxiliary pedal member; and

fourth means connecting the opposite, proximal, end of said inner cable portion, extending beyond said proximal end of said outer sheath portion, to the other of said brake arm and said floor section of said vehicle;

at least a section of said cable member being unconstrained between said distal and proximal ends of said outer sheath portion;

whereby when a passenger ~~steps~~applies force on said auxiliary pedal member said outer sheath portion of said cable member will move relative to said inner cable portion to effectively reduce the distance that said proximal end of said inner cable portion extends beyond said proximal end of said outer sheath portion, thereby causing said brake arm to move sufficiently to cause said servo system to apply said vehicle wheel brake.